Ch. 27 classwork ANSWERS

GPA vs ACT

1. Is there evidence of an association between GPA and ACT score? Specifically, do higher GPAs relate to higher ACT scores? Test an appropriate hypothesis and state your conclusion in the proper context.

**Hypotheses:**

H0: *β*1 = 0 There is no association between student’s GPA’s and ACT scores.

HA: *β*1 > 0 There is a positive association between student’s GPA’s and ACT scores.

**Conditions:**

1. SRS 1) Stated
2. Independence 2) Each student’s GPA and ACT score would be independent of another.
3. Linear Data 3) The scatterplot is linear, no outliers
4. Equal Variance 4) Residual Plot is scattered
5. Nearly Normal residuals 5) The normal prob. plot of the residuals is linear.

All conditions have been met 🡪 t-distribution 🡪 Linear Regression t-test

**Mechanics:**

P( t > 6.803| df = 13) = 0

**Conclusion:**

We reject Ho because P-Value of 0 is less than alpha of 0.05. We have sufficient evidence that the slope of the population regression line is greater than 0. Thus as GPAs increase, ACT scores increase as well.

1. Create and interpret a 95% confidence interval for the slope of the regression line.

(Conditions met above)

We are 95% confident that the slope of the population regression line between GPA and ACT scores is between 5.0484 and 9.7456 points per point.

For every 1 point increase in GPA, the ACT scores go up on average by 5.0484 to 9.7456 points.

1. What is the correlation of GPA and ACT scores? R = 0.8836
2. Is our linear model a good fit for our data? Use the scatterplot, residual plot, and correlation in your answer

Yes. The scatterplot is linear, the residual plot is scattered, and the correlation is strong.

1. Describe the scatterplot of GPA vs. ACT.

Strong, linear, positive

1. What is the predicted ACT score for someone who has a GPA of 3.25?

ACT = -0.427 + 7.397(3.25)

ACT = 23.613 points

1. If we are told that the student that had a GPA of 3.25 received a score of 24 on the ACT, what is their residual?

Residual = observed – predicted = 24 – 23.613 = 0.387 points